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Helicoprion nevadensis (Wheeler, 1939) from the Pennsylvanian–Permian Antler Peak Limestone, Lander County, Nevada (Pisces: Selachii: Helicoprionidae)

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Abstract.—A new specimen of *Helicoprion nevadensis* (Wheeler 1939) is described from the Antler Peak Limestone of Lander County, Nevada. The occurrence is significant as the only other individual of the species known has no geographic or stratigraphic information. The new specimen is dated as Wolfcampian (Early Permian) using associated fusulinids. Presence of *H. nevadensis* in Nevada and similar species in California confirms open-marine connections between the Permian shelf of North America and coeval island arcs to the west.

A new specimen of the spiral tooth-whorl shark fossil, *Helicoprion nevadensis* (Wheeler 1939) is described from the Pennsylvanian-Permian Antler Peak Limestone of Lander County, Nevada. This is only the second individual of the species discovered. The original geographic and stratigraphic location of the holotype are unknown. In contrast, this specimen is precisely located and accurately dated for the first time. It is Wolfcampian (Lower Permian) based upon cooccurrence of fusulinids. Although this occurrence does not resolve the controversy surrounding longitudinal separation between the North American continental margin and coeval island arcs to the west (Harwood and Miller 1990), this accurate locality and biostratigraphic information does allows us to conclude that open marine connections existed between North American (autochthonous) shelf seas and island arc (allochthonous) deposits during the Early Permian.

Systematic Paleontology

Family Helicoprionidae Bendix-Almgreen, 1966

Genus *Helicoprion* Karpinsky, 1899

Helicoprion nevadensis Wheeler, 1939

Fig. 1

Helicoprion nevadensis.—Wheeler, 1939: 109–112, fig. 3.

Description.—The symphysial whorl of the specimen consists of 1.5 volutions and is broken off at both juvenile and adult ends (Fig. 1). The maximum preserved diameter (tooth crown tip to tooth crown tip) is 100.35 mm. Description is compromised by the fact that the enclosing rock is broken so that most of the specimen is split laterally, and several tooth crowns are broken off at the shaft and missing. 47 tooth crowns are preserved in one volution. For a well-preserved tooth at approximately 1 volution, the volution height (V) is 20.2 mm, the shaft height (S) is 2.3 mm, with an S/V ratio of 0.11. No serration denticles are preserved.

Depository.—The specimen is deposited in the University of California Museum of Paleontology (UCMP) as specimen 140632.

Location.—From UCMP Locality V94012, in western Lander County, Nevada, with a Township/Range coordinate of T32N, R44E, in NE ¼ of SE ¼ of Section 21 on the Snow Gulch, Nevada, 7.5-minute U.S. Geological Survey quadrangle, 1991 edition. The specimen occurs in pale brown

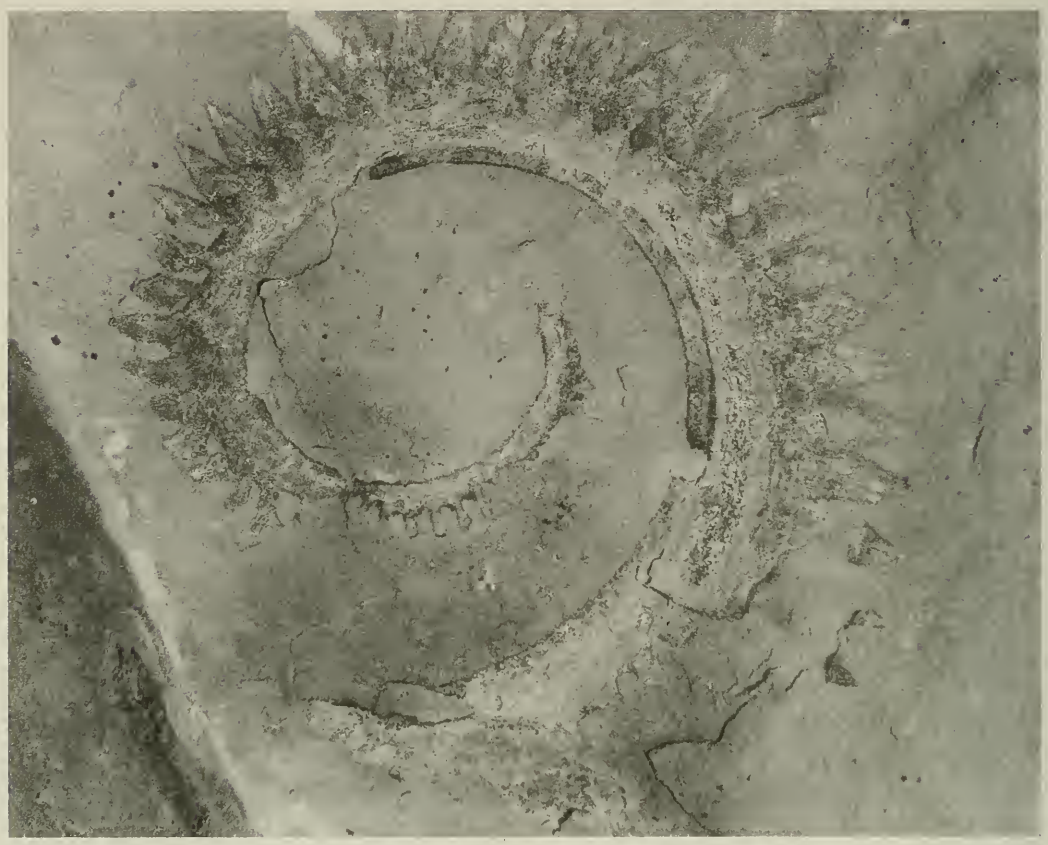

Fig. 1. *Helicoprion nevadensis.* (UCMP 140632) from the Antler Peak Limestone, Lander County, Nevada, X 1.1.

siltite of the siliclastite-dominated facies of the Antler Peak Limestone (Theodore 1994).

Comparison.—Several workers (Bendix-Almgreen 1966, Siedlecki 1970) have noted the very strong similarities of all described *Helicoprion* species. Unfortunately, *Helicoprion* fossils are always found as isolated specimens, not populations. The possibility exists that much of the published species diversity of the genus actually reflects the range of morphologic variation of very few, or even a single species. Because of this taxonomic imprecision and the incompleteness of UCMP 140632, specific taxonomic placement is difficult. For S/V ratio and number of tooth crowns/volution, UCMP 140632 is most like Wheeler's (1939) holotype *H. nevadensis,* UCMP 1001.

Biostratigraphy.—UCMP Locality V94012 occurs between strata containing fusulinid foraminifera (Verville et al. 1986). Several species of *Schwagerina* confirm a Wolfcampian age for UCMP 140632, consistent with the established geologic range of *Helicoprion* (Wolfcampian–Guadalupian).

Biogeography.—The genus *Helicoprion* has a worldwide distribution, with species described from Russia (Karpinsky 1899, Obruchev 1953, for summary), Japan (Yabe 1903, Araki 1980), Laos (Hoffet 1933), Australia (Teichert 1940), Spitsbergen (Siedlecki 1970), Arctic Canada (Nassichuk & Spinosa 1970, Nassichuk 1971), British Columbia, Alberta (Logan & McGugan 1968), Idaho, Wyoming (Hay 1907, 1909; Williams & Dunkle 1948; Bendix-Alm-

green 1966), Nevada, California (Wheeler 1939, Larson & Scott 1955, this report) West Texas (Kelly & Zangerl 1976, Chorn 1978), and Mexico (Mulleried 1940), Thus, *Helicoprion* is found within rocks of many Permian benthic faunal provinces (see for example, Shi et al. 1995, Yancey 1975, Bambach 1990). Collectively, these provinces span polar to equatorial paleolatitudes in both hemispheres, a remarkable distribution, even for a nektic organism, suggesting that temperature was not a limiting factor for *Helicoprion.*

Paleogeography.—Documenting the occurrence of *Helicoprion* is problematic in the paleogeographically "suspect" accreted terrane region of western North America. Besides UCMP 140632, only three individual specimens are known. The holotype of *H. nevadensis* Wheeler, 1939, described originally as from the Koipato Group of the Humboldt Range, Nevada, is considered by Silberling (1973) not to have been obtained from the Koipato Group because of discrepancies between the lithology of the rock fragments attached to the fossil and the diagnostic lithologies of the Koipato Group. *Helicoprion sierraensis* Wheeler, 1939 is said to be found by an amateur "in a glacially transported boulder in the valley of Frazier Creek, California." Convoluted interpretations have to be proposed to attempt to determine provenance for the fossil. A third reported specimen from Nevada, *H.* sp., is reasonably located, but comes from autochthonous rocks near Elko, Nevada (Larson & Scott 1955). This specimen is not figured in any publication, nor is its museum deposition mentioned. The current location of the specimen is unknown.

Heretofore, lack of adequate documentation for the genus has prevented reliable paleogeographic inference. The joint occurrence of *Helicoprion* in autochthonous rocks of the Early Permian continental margin (Wheeler 1939, Larson & Scott 1955, Roberts et al. 1958, this report) and in the allochthonous Northern Sierra terrane of McCloud Belt faunal affinity (Harwood 1992, Miller 1987) should not be taken as evidence of original paleogeographic proximity of the McCloud Belt to North America during the Permian, nor can it resolve the problem of longitudinal separation. However, presence of the nektic genus in both areas does suggest presence of open marine conditions between these tectonic elements.

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